



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/043,534 | 01/10/2002 | Homer Chou | 00044X215193 | 6245 |

29050 7590 10/04/2004

STEVEN D WESEMAN, ASSOCIATE GENERAL COUNSEL, IP
CABOT MICROELECTRONICS CORPORATION
870 NORTH COMMONS DRIVE
AURORA, IL 60504

EXAMINER

VINH, LAN

ART UNIT PAPER NUMBER

1765

DATE MAILED: 10/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/043,534

Applicant(s)

CHOU ET AL.

Examiner

Lan Vinh

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 July 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 13 and 15-27 is/are rejected.
- 7) ☒ Claim(s) 9-12 and 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-8, 13, 15, 16-18, 20, 22-24, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimoto et al (US 6,582,761) in view of Sun et al (US 6,159,076)

Nishimoto discloses an aqueous dispersion/a system for polishing for CMP comprising: ion-exchanged water (claimed liquid carrier), ammonium persulfate (col 19, lines 24-26), silane coupling agent (col 8, lines 10-15), polishing pad (col 24, lines 20-22) and metal abrasive (col 14, lines 41-44)

Unlike the instant claimed invention as per claim 1, Nishimoto does not specifically disclose using ammonium oxalate in his aqueous dispersion.

Sun discloses a method for polishing metal using an abrasive CMP solution comprises of ammonium oxalate as a chelating agent(see abstract)

Since Nishimoto is concerned with the step of polishing metal (col 24, lines 5-35) and Sun discloses that his slurry is used to polish surfaces comprises Ni, Al or other metals (col 2, lines 51-53), one skilled in the art would have found it obvious to modify Nishimoto's polishing solution by using ammonium oxalate as per Sun because Sun discloses that it is believed that the ammonium oxalate provides the improvement in

material removal rate by providing a ligand that bonds strongly with metal (nickel) and moreover is a chelating of nickel/metal (col 8, lines 35-39)

The limitations of claims 2-3, 13 have been discussed above.

Regarding claims 4-5, Nishimoto discloses that the polishing pad is porous polyurethane (col 24, lines 20-21), which reads on a non-abrasive pad

Regarding claims 6-8, Nishimoto discloses using silica /abrasive suspended in an aqueous dispersion (col 14, lines 41-43)

Regarding claim 15, Nishimoto discloses that the pH of the aqueous dispersion is from 2-9 (col 10, lines 14-15)

Regarding claims 16, 22, Nishimoto discloses polishing a portion of the substrate using the aqueous dispersion (col 27, lines 20-22)

Regarding claims 17-18, 20, 23-24, 26, Nishimoto discloses forming working film of silicon oxide, copper, tantalum (col 17, lines 8-17)

3. Claims 19, 21, 25, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishimoto et al (US 6,582,761) in view of Sun et al (US 6,159,076) and further in view of Ni (US 6,503,766)

Nishimoto as modified by Sun has been discussed above. Unlike the instant claimed inventions as per claims 19, 21, 25, 27, Nishimoto and Sun do not disclose the specific removal rate ratio of the layer although Nishimoto discloses polishing a film composed of a lower dielectric layer (col 29, lines 35-37)

Ni, in a method for CMP, discloses that a polishing rate can be optimized by adjusting a polishing parameter such as polishing agent flow (col 6, lines 3-7)

Hence, one skilled in the art would have found it obvious to modify Nishimoto and Sun to adjust the polishing agent flow to optimize the removal rate because Ni discloses that the polishing removal rate is a result effective variable in the same field of endeavor.

Allowable Subject Matter

4. Claims 9-12, 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

No prior art of record discloses using ureidopropyltrimethoxylane as a hydroxy coupling agent in a polishing solution.

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sasaki (US 5,226,930) discloses a polishing solution comprises silica and silane (see abstract)

Response to Arguments

6. Applicant's arguments filed 7/15/2004 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references of Nishimoto and Sun because Sun teaching is directed toward the polishing of nickel-containing substrate whereas Nishimoto is directed toward polishing copper and the working film of a semiconductor device, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, since Nishimoto discloses that pure copper film and the like are listed as a working film (col 17, lines 10-12) while Sun discloses that his slurry is used to polish surfaces comprising Ni or other metal (col 2, lines 50-53) and the motivation to combine Nishimoto and Sun (the advantage of using ammonium oxalate in a slurry) is found in Sun (paragraph 2 above), one skilled in the art would have found it obvious to employ Sun's ammonium oxalate in Nishimoto polishing system in order to produce the claimed invention.

The applicants also argue that, as demonstrated in the specification, the invention provides unexpected results that are sufficient to overcome any prima facie obviousness rejection based upon the cited reference. However, the examiner notes that showing of unexpected results must compare closest prior art. Ex parte Beck 9

USPQ 2d 2000 (BPAI 1987); In re claims Burkel 201 USPQ 67 (CCPA 1979). Also, it is noted that Evidence of unobviousness must be commensurate in scope with the claims. In re claims Kulling 14 USPQ 2d 1056, 1058 (Fed. Cir. 1990); In re claims Clemens 206 USPQ 289 (CCPA 1980). In this case, the applicants argue that the instant invention provides unexpected result to show the dramatic increase in the removal rate exhibited by the inventive polishing system. However, the independent claim 1 does not recite "an increase in the removal rate". Thus, the examiner asserts that the provided unexpected results are not sufficient to overcome any prima facie obviousness rejection based upon the cited reference.

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



LV
October 1, 2004